

REMARKS

Non-elected claims 22-25 have been withdrawn based on the Election filed on January 24, 2005.

Claims 1-21 stand rejected under 35 USC §112, second paragraph, as being indefinite. Specifically, the Examiner points out that claim 1 recites "a vacuum plenum having a flat surface" (line 3) and subsequently recites "the plenum surface" (line 5). The Examiner finds it unclear as to whether these two surfaces are the same or different.

Claim 1 has been amended by inserting the word --flat-- before the word "plenum" in line 5. This is believed to properly clarify the term and overcome the objection.

The Examiner further points out that claim 20 is confusing with regard to which vacuum starter opening is claimed, particularly with respect to dependency of claim 20 from claim 18, which also recites starter openings.

Claims 18 and 20 have been extensively amended and these clarifying amendments are believed to overcome the Examiner's rejection.

Finally, with respect to claim 13, the Examiner finds it unclear as to the structural relationship which allows the valves to be biased open for vacuum communication at a second pressure differential across the valve.

In currently amended claim 13, the recitation of "means for biasing the valves" to open has been added to provide the necessary structural support. A review of the claim also suggested the need for clarifying amendments similar to those made in claim 1 with respect to the plenum surface. Therefore, claim 13 has been amended in a manner similar to claim 1.

Claims 1-5, 7-14 and 16-20 stand rejected under 35 USC §103(a) as unpatentable over Kuzniak (U.S. 3,845,950) in view of Louis et al (U.S. 4,411,420). With respect to independent claim 1, the Examiner finds that Kuzniak discloses a self-valving vacuum distribution system for a sheet transfer apparatus that includes a vacuum

plenum (1) that has a flat bottom surface over which spaced rotating members (11) operate to define an open vacuum channel (3); and vacuum control valves (9a, 9b, etc.) spaced along the channel (3) in the plenum surface, the control valves held closed by a high pressure differential between the vacuum plenum (1) and the open vacuum channel (3) and biased to open under a reduced pressure differential between the vacuum plenum and the vacuum channel when the channel is covered by a sheet (13) carried over the channel. Kuzniak includes rotating members (11) that convey the sheets (13), but does not specifically disclose or recite conveyor belts as claimed. Louis et al discloses a conveyor that includes a support with controlled suction valves and a plurality of spaced conveyor belts (6) surrounding the support. Louis et al teaches that it is necessary for sheets to be positioned accurately in relation to one another on the conveying apparatus in order to maintain register. Louis also discusses different types of arrangements of rotating devices suitable to perform this operation. The Examiner concludes that it would have been obvious to one skilled in the art to substitute the spaced apart belts (6) of Louis et al for the rotating devices (11) of Kuzniak because this merely involves substitution of an equivalent conveying device.

The foregoing rejection is respectfully traversed and reconsideration is requested in view of the amendment to claim 1 and the comments which follow.

A careful examination of Kuzniak reveals that there are significant differences in the construction and operation of the Kuzniak device as compared to applicants' apparatus. First of all, Kuzniak is a very high air volume system that relies on high volume leakage past the control valves to operate. Referring particularly to Figs. 1-3 and 7 of Kuzniak, and the description of the operation of the Kuzniak system beginning in line 7 of column 7, initial vacuum pressure or suction in the system depicted in Fig. 1 is very low (i.e. below the level C in Fig. 1), the valves (9a, 9b, etc.) are open, and the flow rate high (i.e. greater than C). As a sheet is introduced into the Kuzniak system (as in Fig. 2), the opening to upstream chamber 7 is closed by the sheet and the increased suction causes all of the downstream control valves (9a, 9b, etc.) to close.

In applicants' apparatus, by comparison, when the plenum is at full negative pressure and no sheets present, all of the vacuum control valves 34 are held closed by the high pressure differential. The only air loss is a comparatively small volume passing through the starter vacuum openings 30. As the lead edge 50 of a sheet 51 enters the apparatus and initially covers the vacuum starter openings 30, the sheet begins to cover the shallow vacuum channel 22 and the vacuum pressure in the plenum, applied through the starter openings, will be applied as well to the channel 22 and propagate in the downstream direction as the sheet is carried on the conveyor belts 12. Thus, applicants' vacuum control valves 34 are already closed when vacuum is applied to the system with no sheet present and, as the sheet moves to cover the vacuum starter openings 30, there is initially no movement of the control valves 34.

Referring again to the Kuzniak system and, in particular, to Figs. 3 and 7, as the leading edge of the sheet (13) moves downstream from the Fig. 2 position to the Fig. 3 position, the differential pressure across the first closed valve (obturator 9a) must be less than C for the valve (9a) to open. In the graph of Fig. 7, the vacuum differential at C is about 25% of the vacuum differential pressure at B and about 20% the pressure differential at A (A and B being the range at which vacuum pressure stabilizes after closure of the upstream chamber (7) by the advancing sheet (13) in Fig. 2). In order for the first valve (9a) of chamber (7a) to open, as the sheet (13) advances to close the chamber (7a), the differential pressure across the first valve (9a) must be less than the value at C (e.g. 20%-25% of the value in the range of A to B). This means that the vacuum pressure in the chamber (7a) must already be at 75%-80% of the vacuum in plenum (8). Thus, the static vacuum in the chamber (7a) which is achievable merely by the leak in the valve (obturator 9a) is 75%-80% of full plenum vacuum that would be attained when the valve (9a) is fully open. This suggests two undesirable features of the Kuzniak system. First of all, the high leakage past the closed control valves is wasteful. In addition, with 75%-80% of the vacuum available in the chamber (7a) even when the

valve is closed, the entire system may operate to hold and convey sheets even without opening the control valves (9a, 9b, etc.).

In applicants' apparatus, on the other hand, starter vacuum air flow is very small, there is no leakage past the closed control valves, and the vacuum that is applied to the starter openings 30 is generated by a relatively low air flow that is strictly confined to the shallow vacuum channel 22.

The most significant difference and deficiency in the Kuzniak system, however, lies in the fact that Kuzniak has no vacuum channel that is the same or equivalent to applicants' vacuum channel 22 by which the vacuum pressure utilized to generate the reduced pressure differential between the vacuum plenum and the vacuum channel functions sequentially to move downstream with the moving sheet and successively open each vacuum control valve 34.

Although the Examiner suggests that the bottom surface (unnumbered) of the vacuum plenum (1) and the rotating members (11) of Kuzniak define an open vacuum channel (3), each of the valve chambers (7a, 7b, etc.) is sealed from adjacent valve chambers by the flexible skirts (12). Thus, there is no communication of vacuum or of air flow of any kind from one vacuum chamber to the next. Indeed, even the upstream open compartment (7) is sealed from the first vacuum chamber (7a) by a flexible skirt (12). Therefore, the function of what the Examiner characterizes as a vacuum starter opening (7) is not to assist in the opening of the first operating valve (9a), but rather to raise the pressure in the entire plenum and to in fact close all of the control valves, as shown in Fig. 2. Because there is no communication downstream of vacuum pressure from Kuzniak's "starter opening" (7), each of the serially arranged downstream vacuum chambers and control valves (7a, 9a; 7b, 9b, etc.) must and in fact does operate completely on its own.

In addition to correcting the §112 rejections, claim 1 has been amended to further clarify the invention and distinguish it from Kuzniak and Kuzniak as modified by Louis et al. With respect to independent claim 13, it has been amended to address the

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§112 rejections but is otherwise believed to distinguish over Kuzniak and be allowable for the reasons set forth above. Therefore, amended claims 1-21 are now believed to be in condition for allowance and further favorable action is respectfully requested.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Joseph J. Jochman", written over the printed name.

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